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Date:	May 10, 2006		
To:	Board of Patent Appeals		(571) 273-8300
From:	Kevin J. Zilka		

Docket No.: NVIDP224B/P000872 **App. No.: 10/658,224**

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Kevin J. Zilka

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May 10, 2006

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Greene et al.

Application No. 10/658,224

Filed: 09/08/2003

For: SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR UPDATING A FAR CLIPPING PLANE IN ASSOCIATION WITH A HIERARCHICAL DEPTH BUFFER

Group Art Unit: 2673

Examiner: Nguyen, Phu K.

Date: 05/10/2006

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Board of Patent Appeals and Interferences

APPEAL BRIEF (37 C.F.R. § 41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on January12, 2006, and in response to the Notice of Panel Decision from Pre-Appeal Brief Review mailed March 14, 2006.

The fees required under § 1.17, and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(i)):

VII ARGUMENTS

VIII APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

IX APPENDIX LISTING ANY EVIDENCE RELIED ON BY APPELLANT IN THE APPEAL

X RELATED PROCEEDING APPENDIX

The final page of this brief bears the practitioner's signature.

I REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest in this appeal is NVIDIA Corporation.

II RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c) (1)(ii))

With respect to other prior or pending appeals, interferences, or related judicial proceedings that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal, no such pending appeals, interferences, or related judicial proceedings exist.

A Related Proceedings Appendix is appended hereto.

III STATUS OF CLAIMS (37 C.F.R. § 41.37(c) (1)(iii))

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 1-3, 6-9, 12-14, and 16-24

B. STATUS OF ALL THE CLAIMS IN APPLICATION

1. Claims withdrawn from consideration: None
2. Claims pending: 1-3, 6-9, 12-14, and 16-24
3. Claims allowed: None
4. Claims rejected: 1-3, 6-9, 12-14, and 16-24
5. Claims cancelled: 4, 5, 10, 11, and 15

C. CLAIMS ON APPEAL

The claims on appeal are: 1-3, 6-9, 12-14, and 16-24

See additional status information in the Appendix of Claims.

IV STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

As to the status of any amendment filed subsequent to final rejection, there is no amendment after final.

V SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

With respect to a summary of Claims 1, 2, 8, and 13, as shown in Figures 1-27, a graphics system, method, and computer program product are provided for graphics processing. Included is a scene manager (e.g. see item 110 of Figure 1, etc), a geometric processor (e.g. see item 120 of Figure 1, etc), a renderer (e.g. see item 140 of Figure 1, etc), and a far clipping plane (e.g. see item 408 of Figure 4, etc) that is capable of being updated substantially based on a farthest depth value in a z-pyramid (e.g. see item 170 of Figure 1, etc), if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane.

VI GROUNDS OF REJECTION PRESENTED FOR REVIEW (37 C.F.R. § 41.37(c)(1)(vi))

Following, under each issue listed, is a concise statement setting forth the corresponding ground of rejection.

Issue # 1: The Examiner has rejected Claims 1-3, 6-9, 12-14, and 16-24 under 35 U.S.C. 103(a) as being unpatentable over Greene et al. ("Hierarchical Z-buffer Visibility") in view of Dehmlow et al. (U.S. Patent No. 5,999,187).

VII ARGUMENTS (37 C.F.R. § 41.37(c)(1)(vii))

The claims of the groups noted below do not stand or fall together. In the present section, appellant explains why the claims of each group are believed to be separately patentable.

Issue #1:

The Examiner has rejected Claims 1-3, 6-9, 12-14, and 16-24 under 35 U.S.C. 103(a) as being unpatentable over Greene et al. ("Hierarchical Z-buffer Visibility") in view of Dehmlow et al. (U.S. Patent No. 5,999,187).

Group #1: Claims 1-3, 6-9, 12-14, and 17-19

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on appellant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991).

With respect to the first element of the *prima facie* case of obviousness and, in particular, the obviousness of combining the aforementioned references, the Examiner argues that it would have been obvious to update the far clipping plane because it improves the z-buffer resolution and accuracy of graphics selection. To the contrary, appellant respectfully asserts that it would not have been obvious to combine the teachings of the Greene and Dehmlow references, especially in view of the vast evidence to the contrary.

Specifically, Dehmlow relates to a computer aided design (CAD) system, while Greene relates to a visibility algorithm. To simply glean features from a CAD system, which aids in the creation and display of objects on a computer (such as in Dehmlow), and combine the same with the *non-*

analogous art of visibility algorithms (such as in Greene), would simply be improper. "In order to rely on a reference as a basis for rejection of an appellant's invention, the reference must either be in the field of appellant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also In re Deminski, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986); In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992) In view of the vastly different types of problems a CAD system addresses as opposed to a visibility algorithm, the Examiner's proposed combination is inappropriate.

In the Advisory mailed 12/09/05, the Examiner, in response, argues that "Delmlow uses [an] image visibility technique for displaying images on his CAD system, so he teaches the area of image visibility algorithm as claimed." Appellant respectfully disagrees, as it appears that the Examiner has simply generalized his description of the art of Delmlow to the point that it becomes analogous with that of Greene. Appellant respectfully disagrees with this approach, since, if a relevant description is broadened sufficiently, any and all arts are analogous to some extent.

More importantly, with respect to the third element of the *prima facie* case of obviousness, the Examiner has not even addressed appellant's previously amended claim language, as set forth below:

"...said system comprising means for updating said far clipping plane based on the farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane" (emphasis added - see the same or similar, but not necessarily identical language in each of the independent claims).

Further, in the Office Action mailed 10/06/05, the Examiner merely points to page 2, col. 2 to page 3, col. 1 (section 3.1) from Greene to make a prior art showing of appellant's claimed "z-pyramid." Appellant contends, however, that the mere mention of a "z-pyramid" in Greene in no way meets appellant's claimed functionality surrounding a z-pyramid, namely, updating a far clipping plane based on the farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane, as claimed.

Appellant respectfully asserts that neither the Greene nor Dehmlow reference teach that the far clipping plane is updated substantially based on a farthest depth value which is included in a z-pyramid, in the manner claimed by appellant. In fact, Dehmlow teaches that "far clipping planes are positioned dynamically based on the part(s)...that are present within the five-point view frustum boundary 714" (see Col. 12, lines 43-46). Clearly, simply suggesting that a far clipping plane be within a five-point view frustum boundary, as in Dehmlow, does not meet and even *teaches away* from a farthest depth value included in a z-pyramid, in the manner claimed by appellant.

Still yet, as mentioned hereinabove, the Examiner has failed to make a prior art showing of appellant's claimed condition upon which the claimed updating is based, namely if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane, as claimed. Only appellant teaches and claims a far clipping plane that is updated substantially based on a farthest depth value in a z-pyramid conditionally upon the aforementioned specific criteria associated with the z-pyramid.

In the Advisory mailed 12/09/05, the Examiner, in response, argues that "Delmlow's update of the far clipping plane on zbuffer and Green's z-pyramid can be combine[d] to yield the update of the far clipping plane on a value of a pyramid z-buffer." Again, appellant respectfully disagrees, as this argument appears to be redundant with respect to those set forth in the Office Action mailed 10/06/05. Again, for the reasons set forth above, appellant finds it improper for the Examiner to support his rejection by simply pointing to the disclosure of a "z-pyramid" in a vacuum in Greene, and the disclosure in Dehmlow merely suggesting that a far clipping plane be within a five-point view frustum boundary. These two disclosures, when combined, do not together meet appellant's claim language (particularly the functional language noted above).

Appellant respectfully asserts that at least the first and third elements of the *prima facie* case of obviousness have not been met, since the Examiner's proposed modification would not be obvious and further the prior art references, when combined, fail to teach or suggest all the claim limitations.

Group #2: Claim 16

With respect to Claim 16, the Examiner has relied on the following excerpts from Dehmlow to make a prior art showing of appellant's claimed technique "wherein the updating includes resetting the far clipping plane to the farthest depth value."

> "In another embodiment the near and far clipping planes are positioned dynamically based on the part(s) (i.e. the cells that have non-null cell-to-art mappings) that are present within the five-point view frustum boundary 714. The near and far clipping planes are positioned as close to the part(s) as possible without actually clipping any of the part(s) from the resulting image that is generated. This clip plane "clamping" reduces the distance between the clipping planes and improves the z-buffer resolution of the graphics system. This is turn improves the accuracy of the graphics selection mechanism. Furthermore, surfaces that are close together are displayed more precisely (with respect to how the surfaces occlude each other). The actual position of the clipping planes is determined after the cells have been sorted in order of distance from the virtual camera and before any primitives are sent to the graphics system for rendering. The closest point on the closest cell (with a non-null cell-to-part mapping) to the virtual camera is used to position the near clipping plane. In a similar fashion, the farthest point on the farthest cell (again with a non-null cell-to-part mapping) is used to position the far clipping plane. Since the cells are already sorted for the subsequent scene processing, this procedure can be used at interactive frame rates." (Col. 12, lines 49-53)

Appellant respectfully disagrees, as the Examiner has not taken the forgoing claim language of Claim 16 into context. Specifically, the claimed "farthest depth value" is specifically included in a z-pyramid, as set forth in intervening Claim 1.

Thus, at least for the reasons set forth with respect to the independent claims, at least the first and third elements of the *prima facie* case of obviousness have not been met, since the Examiner's proposed modification would not be obvious and further the prior art references, when combined, fail to teach or suggest all the claim limitations.

Group #3: Claim 20

With respect to Claim 20, the Examiner has relied on page 3, col. 2, and page 5, col. 2 from Greene make a prior art showing of appellant's claimed technique "wherein the tip of the z-pyramid includes a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a culling stage of the graphics system."

Appellant respectfully disagrees with this assertion. Specifically, Greene merely makes the mention of a z-pyramid with coarse and fine levels within the same z-pyramid. In sharp contrast, appellant teaches and claims a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a culling stage of the graphics system. Only appellant teaches and claims updating a far clipping plane based on the farthest depth value in a z-pyramid that has a lower resolution with respect to another z-pyramid maintained by a culling stage of the graphics system, as claimed.

Thus, at least for the reasons set forth with respect to the independent claims, at least the first and third elements of the *prima facie* case of obviousness have not been met, since the Examiner's proposed modification would not be obvious and further the prior art references, when combined, fail to teach or suggest all the claim limitations.

Group #4: Claim 21

With respect to Claim 21, the Examiner has relied on page 3, col. 2, and page 5, col. 2 from Greene make a prior art showing of appellant's claimed technique "wherein the tip of the z-pyramid includes a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a hierarchical rendering stage of the graphics system" (see Claim 21).

Appellant respectfully disagrees with this assertion. Specifically, Greene merely makes the mention of a z-pyramid with coarse and fine levels within the same z-pyramid. In sharp contrast, appellant teaches and claims a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a hierarchical rendering stage of the graphics system. Only appellant teaches and claims updating a far clipping plane based on the farthest depth value in a z-pyramid that has a lower resolution with respect to another z-pyramid maintained by a hierarchical rendering stage of the graphics system, as claimed.

Thus, at least for the reasons set forth with respect to the independent claims, at least the first and third elements of the *prima facie* case of obviousness have not been met, since the Examiner's

proposed modification would not be obvious and further the prior art references, when combined, fail to teach or suggest all the claim limitations.

Group #5: Claims 22-23

Still yet, the Examiner merely dismisses the following subject matter of Claims 22-23 as being well known in the art: "wherein depth values of the z-pyramid are encoded" (see Claim 22), and "wherein the depth values of the z-pyramid are encoded for reducing storage requirements thereof" (see Claim 23). Appellant respectfully disagrees, as only appellant teaches and claims such encoding in the specific context of depth values of the z-pyramid, in the context claimed, for improved updating and/or related processing.

Thus, with respect to Claims 22-23, it appears that the Examiner has simply dismissed the same under Official Notice. In response, appellant again points out the remarks above that clearly show the manner in which some of such claims further distinguish the prior art references of record. Appellant thus formally requests a specific showing of the subject matter in ALL of the claims in any future action. Note excerpt from MPEP below.

> "If the appellant traverses such an [Official Notice] assertion the examiner should cite a reference in support of his or her position." See MPEP 2144.03.

Group #6: Claim 24

Even still, with respect to Claim 24, the Examiner has relied on col. 12, lines 43-53 from Dehmlow and page 3, col. 1 from Greene to meet appellant's claimed technique "wherein the updating accelerates a culling of a box since a depth of a nearest corner of the box is farther than the farthest depth value." Appellant respectfully disagrees, as the mere mention of culling in Greene does not rise to the level of specificity of the culling "of a box," as claimed. Further, neither of the references makes any mention of updating a far clipping plane based on the farthest depth value in a z-pyramid for the specific purpose of accelerating the culling of a box specifically due to the fact that a depth of a nearest corner of the box is farther than the farthest depth value.

Again, at least the first and third elements of the *prima facie* case of obviousness have not been met, since the Examiner's proposed modification would not be obvious and further the prior art references, when combined, fail to teach or suggest all the claim limitations.

VIII APPENDIX OF CLAIMS (37 C.F.R. § 41.37(c)(1)(viii))

The text of the claims involved in the appeal (along with associated status information) is set forth below:

1. (Previously Presented) A graphics system including a scene manager, geometric processor means, renderer means, and a far clipping plane, said system comprising means for updating said far clipping plane based on the farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane.

2. (Previously Presented) A graphics system, comprising:
a geometric processor;
a renderer; and
a far clipping plane that is capable of being updated substantially based on a farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane.

3. (Original) The graphics system of claim 2, and further comprising a scene manager.

4. (Cancelled)

5. (Cancelled)

6. (Previously Presented) The graphics system of claim 2, wherein a culling stage is coupled between the geometric processor and the renderer.

7. (Original) The graphics system of claim 2, wherein the far clipping plane is updated based on the farthest depth value.

8. (Previously Presented) A method for graphics processing, comprising:
transforming geometry utilizing a geometric processor;
performing a culling operation;

rendering utilizing a renderer; and

updating a far clipping plane as a function of a farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane.

9. (Original) The method of claim 8, wherein a scene manager is in communication with the geometric processor.

10. (Cancelled)

11. (Cancelled)

12. (Previously Presented) The method of claim 8, wherein a culling stage is coupled between the geometric processor and the renderer.

13. (Previously Presented) A computer program product embodied on a computer readable medium for graphics processing, comprising:

computer code for transforming geometry;

computer code for performing a culling operation;

computer code for rendering; and

computer code for updating a far clipping plane as a function of a farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane.

14. (Original) The computer program product of claim 13, and further comprising computer code for managing a scene.

15. (Cancelled)

16. (Previously Presented) The graphics system of claim 2, wherein the updating includes resetting the far clipping plane to the farthest depth value.

17. (Previously Presented) The graphics system of claim 2, wherein the farthest depth value is included in a tip of the z-pyramid.

18. (Previously Presented) The graphics system of claim 17, wherein the tip of the z-pyramid further includes a coarsest NxN tile in the z-pyramid.

19. (Previously Presented) The graphics system of claim 18, wherein the tip of the z-pyramid further includes additional levels of the z-pyramid.

20. (Previously Presented) The graphics system of claim 17, wherein the tip of the z-pyramid includes a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a culling stage of the graphics system.

21. (Previously Presented) The graphics system of claim 17, wherein the tip of the z-pyramid includes a low-resolution z-pyramid with lower resolution than another z-pyramid maintained by a hierarchical rendering stage of the graphics system.

22. (Previously Presented) The graphics system of claim 17, wherein depth values of the z-pyramid are encoded.

23. (Previously Presented) The graphics system of claim 22, wherein the depth values of the z-pyramid are encoded for reducing storage requirements thereof.

24. (Previously Presented) The graphics system of claim 2, wherein the updating accelerates a culling of a box since a depth of a nearest corner of the box is farther than the farthest depth value.

IX APPENDIX LISTING ANY EVIDENCE RELIED ON BY APPELLANT IN THE APPEAL (37 C.F.R. § 41.37(c)(1)(ix))

There is no such evidence.

X RELATED PROCEEDING APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

N/A

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1351 (Order No. NVIDP224B).

Respectfully submitted,

By: _____ Date: 5/9/06

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